IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **Ikuo TAKAHASHI et al.** Group Art Unit: **1711**

Application Number: **10/698,934** Examiner: **Nathan M. Nutter**

Filed: **November 3, 2003** Confirmation Number: **5043**

For: **AN ALIPHATIC POLYESTER COMPOSITION, A MOLDED ARTICLE THEREOF AND A METHOD FOR CONTROLLING BIODEGRADATION RATE USING THE SAME COMPOSITION**

Attorney Docket Number: **032044**
Customer Number: **38834**

DECLARATION UNDER 37 C.F.R. §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Hirotaka Iida, a citizen of Japan, hereby declare and state the following:

1. I graduated from Nagoya Institute of Technology of Nagoya, Aich, Japan in 1987 with a Bachelor of Science in Engineering Technology in Polymer Engineering.

2. Since 1987, I have been employed by Nisshinbo Industries, Inc., 2-31-11, Ningyo-cho, Nihonbashi, Chuo-ku, Tokyo, Japan where my present title is Research and Development. During my employment therein, I have conducted research and development on modifiers of polyester resins.

3. I have read and am familiar with the above-identified patent application as well as the Official Action dated November 27, 2006, in the application.

4. I have read and am familiar with the contents of cited references, U. S. Patent Nos. 5,616,657 to Imamura, 6,803,443 to Ariga et al., and 6,855,759 to Murschall et al.; and U.S. Patent Application Publication No. 2003/091843 to Murschall et al., cited in the Official Actions in the above-identified application.

5. Under my supervision and control, I conducted experiments to obtain data to show that a carbodiimide compound and a benzotriazole-based compound do not exhibit a synergistic effect when they are used together with an aromatic polyester.

6. The following explains the experiment and data.

Each of the Additional Experiments 1-4 were conducted in substantially the same manner as in Example 4, except the indicated differences in composition as presented in Tables A and B.

Additional Experiments 1 and 2 utilize an *aliphatic* polyester, polylactic acid. Meanwhile, Additional Experiments 3 and 4 utilize an *aromatic* polyester, polyethylene terephthalate (PET). Additional Experiments 1 and 2 utilize both carbodiimide and a benzotriazole (Tinuvin 234) with an aliphatic polyester, and exhibit excellent hydrolysis resistance. See Table A.

Additional Experiment 3 utilizes both carbodiimide and a benzotriazole (Tinuvin 234) with an aromatic polyester. Additional Experiment 4 utilizes only carbodiimide with an aromatic polyester. Additional Experiments 3 and 4 exhibited hydrolysis resistance of 67% and 70%, respectively. Additional Experiment 3 is similar to the disclosure of Murschall '758 and '843. Additional Experiment 4 is similar to Murschall '758 and '843, except that a benzotriazole is not used. See Table B.

Table A

	Example 4	Additional Experiment 1	Additional Experiment 2	Comparative Example 4
1.Composition (parts-by-weight)				
(A) Polyester				
-Polylactic acid (aliphatic)	98.5	98.5	98.8	99
-Polyethylene terephthalate (aromatic)	-	-	-	-
(B) Carbodiimide compound				
-Compound prepared in Synthesis Example 1 to have isocyanate group at the terminal	1	1	1	1
(C) Specified compound				
-Tinuvin 234	-	0.5	0.2	-
-Tinuvin 326	0.5	-	-	-
2. Evaluation Results				
Hydrolysis resistance #1 Strength ratio (%)	98	88	83	37

#1: Tested at 80°C and 90% RH for 150 hours

Table B

	Additional Experiment 3	Additional Experiment 4
1.Composition (parts-by-weight)		
(A) Polyester		
-Polylactic acid (aliphatic)	-	-
-Polyethylene terephthalate (aromatic)	98.8	99
(B) Carbodiimide compound		
-Compound prepared in Synthesis Example 1 to have isocyanate group at the terminal	1	1
(C) Specified compound		
-Tinuvin 234	0.2	-
-Tinuvin 326	-	-
2. Evaluation Results		
Hydrolysis resistance #2 Strength ratio (%)	67	70

#2: Tested at 120°C and 90% RH for 120 hours.

Incidentally, it is noted that PET was used in Additional Experiments 3 and 4, and has a different hydrolysis resistance than polylactic acid. Accordingly, in order to detect hydrolysis resistance of the PET within a reasonable period of time, the conditions for testing Additional Experiments 3 and 4 must be more severe (higher temperature) than those of the other experiments using polylactic acid.

Additional Experiment 3 is identical to Additional Experiment 4, except that a benzotriazole is added. However, Additional Experiments 3 and 4 clearly show that even when a benzotriazole is added, there was no increase in hydrolysis resistance. In fact, the hydrolysis resistance was slightly lower when a benzotriazole was added in Additional Experiment 3. Thus, no unexpected synergistic effect is present. See Table B.

On the other hand, Example 4 and Additional Experiments 1 and 2 exhibited a significant increase in hydrolysis resistance upon the addition of benzotriazole, as compared with an absence of benzotriazole in Comparative Example 4. Thus, an unexpected synergistic effect is present. See Table A.

7. From the attached experimental results, I have concluded, among other things, that a carbodiimide compound and a benzotriazole-based compound do not exhibit a synergistic effect when they are used together with an aromatic polyester.

The undersigned declares that all statements made herein of his own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the application or any patent issued thereon.

Hirotaka Iida

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Signed this 13 day of February, 2007.